

SIMILARITY & RIGHT TRIANGLES




































GENERAL MATHEMATICS – PRELIMINARY
NAME: _____

CAPACITY MATRIX - GENERAL MATHEMATICS

TOPIC: Measurement 3 & 4 - Similarity & Right triangles

2 weeks

CONTENT	CAPACITY BREAKDOWN!	DONE IT!!!!	GOT IT!!!!	ON MY WAY!	WORKING ON IT!	HELP!!!!
Download Chapters 11 and 13 of text, Skillsheets 11.1 - 11.5, Worksheet 11.2, iBlueprint app,						
1. Review - Ratios, Corresponding sides and angles,	Skillsheet 11.1					
2. establishment of properties of similar figures	L1: Skillsheets 11.2 & 11.3 Ex 11A Q1- 13					
3. recognition of similarity in everyday life	L2: Skillsheets 11.2 & 11.3 Ex 11A Q1-13 (odd only) Q14 - 19					
4. finding scale factors of similar figures						
5. recognising that similar figures related by a scale factor of 1 are said to be congruent						
6. use of the relevant enlargement or reduction factor to calculate actual dimensions	Investigate enlargement p 367					
7. development of scale drawings of objects and images						
8. use of scale factor to solve problems involving similar figures	L1: Skillsheet 11.5 Worksheet 11.2 Ex 11B Q1 - 12					
	L2: Skillsheet 11.5 Worksheet 11.2 Ex 11B Q1 - 11 (odd only) Q13-17					
9. transferring measurements between floor plans and elevations	 Download iBlueprint app and list the common symbols for plans. Create your own home using iBlueprint and email to me and yourself. Ex 11C					
10. obtaining measurements from plans of buildings and rooms						
11. calculation of lengths and areas from a floor plan						
12. interpretation of commonly used symbols on house plans.						

CONTENT	CAPACITY BREAKDOWN!	DONE IT!!!!	GOT IT!!!!!!	ON MY WAY!	WORKING ON IT!	HELP!!!!
13. Review of skills	Are you Ready Skillsheet 13.3 & 13.7					
14. Use of Pythagoras' theorem	L1: Ex 13A Q1-15					
	L2: Ex 13A Q6- 21					
15. Defining Trig ratios 16. Use of trig ratios to find an unknown side	L1: Ex 13B Q1-5 Ex 13C Q1- 18					
	L2: Ex 13B Q1-5 Ex 13C Q2, 5-12, 17-24					
17. Use of trig ratios to find an unknown angle to the nearest minute	L1: Ex 13B Q 7& 8 Ex 13D Q1-13					
	L2: Ex 13B Q 7 & 8 Ex 13D Q4-9, 11-19					
18. Angles of elevation and depression	Ex 13E					

SIMILAR FIGURES

Similar figures are the _____ shape but not necessarily the _____.

The symbol for "is similar to" is _____.

The original figure is called the _____ and the enlarged figure is called the _____.

Enlarging or reducing a given figure will always produce a similar figure. The amount by which the figure is enlarged or reduced is called the **scale factor** or **similarity factor**.

$$\text{Scale factor} = \frac{\text{image length}}{\text{original length}}$$

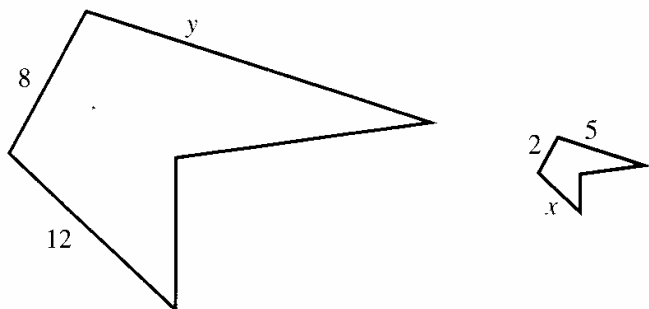
If two figures are similar then:

- ➡ Corresponding angles are equal;
- ➡ The corresponding sides are the same ratio

"corresponding"
means the sides or
angles of two
figures match!

eg a) Calculate the scale factor for these two similar figures.

b) Calculate the values or the pronumerals.



TESTS FOR SIMILAR TRIANGLES

To prove that triangles are similar, you need to prove only that **EITHER**

The **corresponding angles are equal**. **OR**

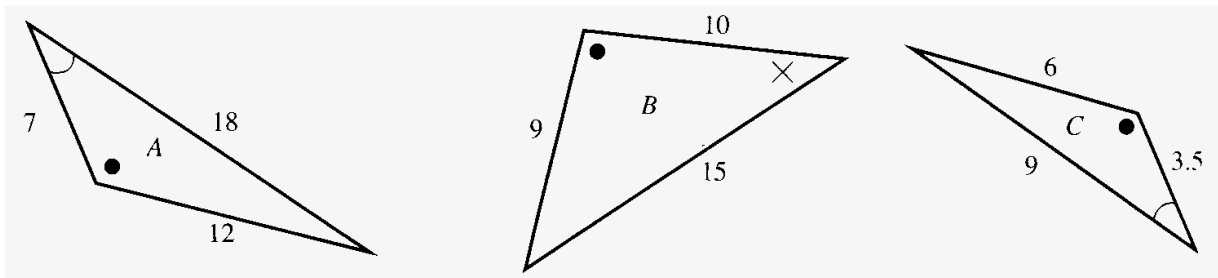
The **corresponding sides are in equal ratio**.

The ratio of the corresponding sides in similar figures can be used to calculate the **scale factor**.

If the scale factor is **1** then the figures are **congruent**.

eg Which two triangles are similar and justify your decision?

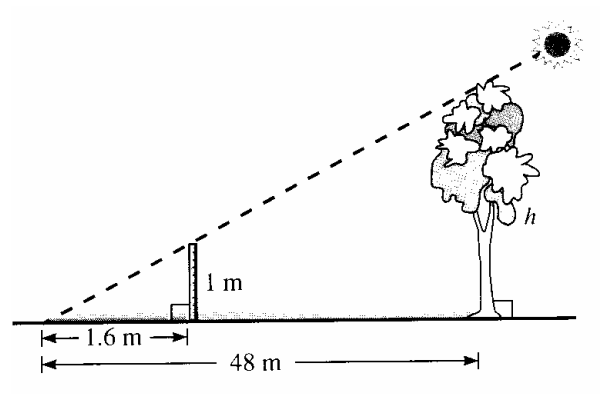
What is the scale factor?



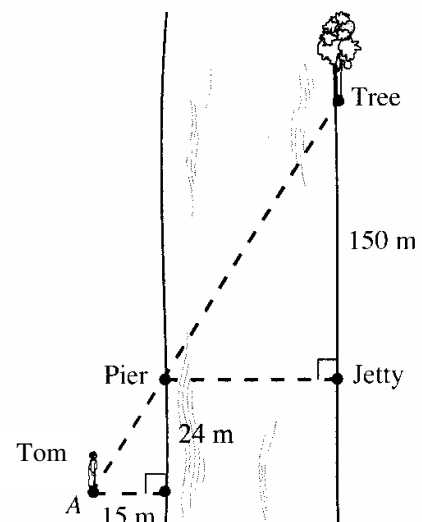
APPLYING SHADOWS & SIMILAR TRIANGLES

The efficient method is to ALWAYS place the unknown in the numerator's position and work from there!

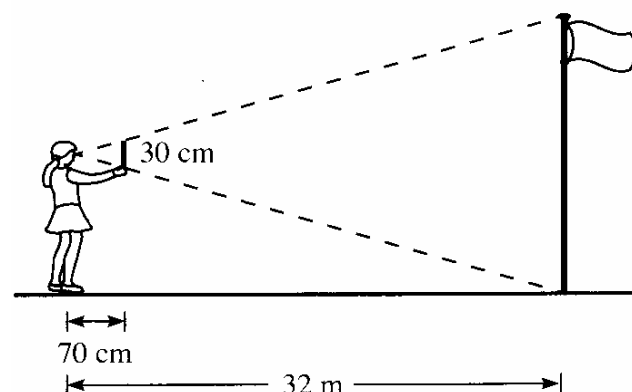
eg The metre rule throws a shadow of 1.6m while the tree throws a shadow of 48m. What is the height of the tree?



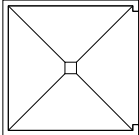
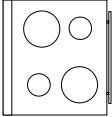
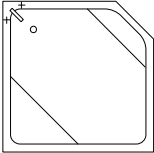
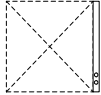

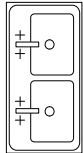
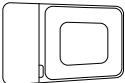
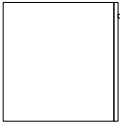
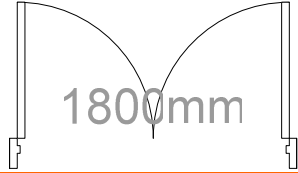
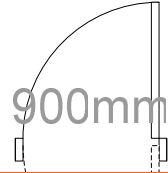


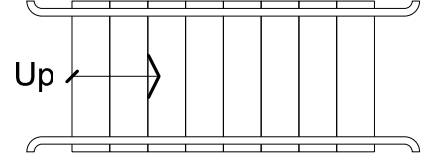

eg Tom is on one side of a canal and takes measurements of 15m and 24m as shown. He then stands at point A so that he is in line with the pier and the tree on the other side of the canal. The distance of the tree from the jetty is known to be 150m. Find the width of the canal.



eg Ketryn is standing 32m from a flagpole. She holds up a 30cm ruler and moves it until it appears the same height as the flagpole. If this occurs, when the ruler is held 70 cm from her eye, how tall is the flagpole (correct to 1 decimal place)



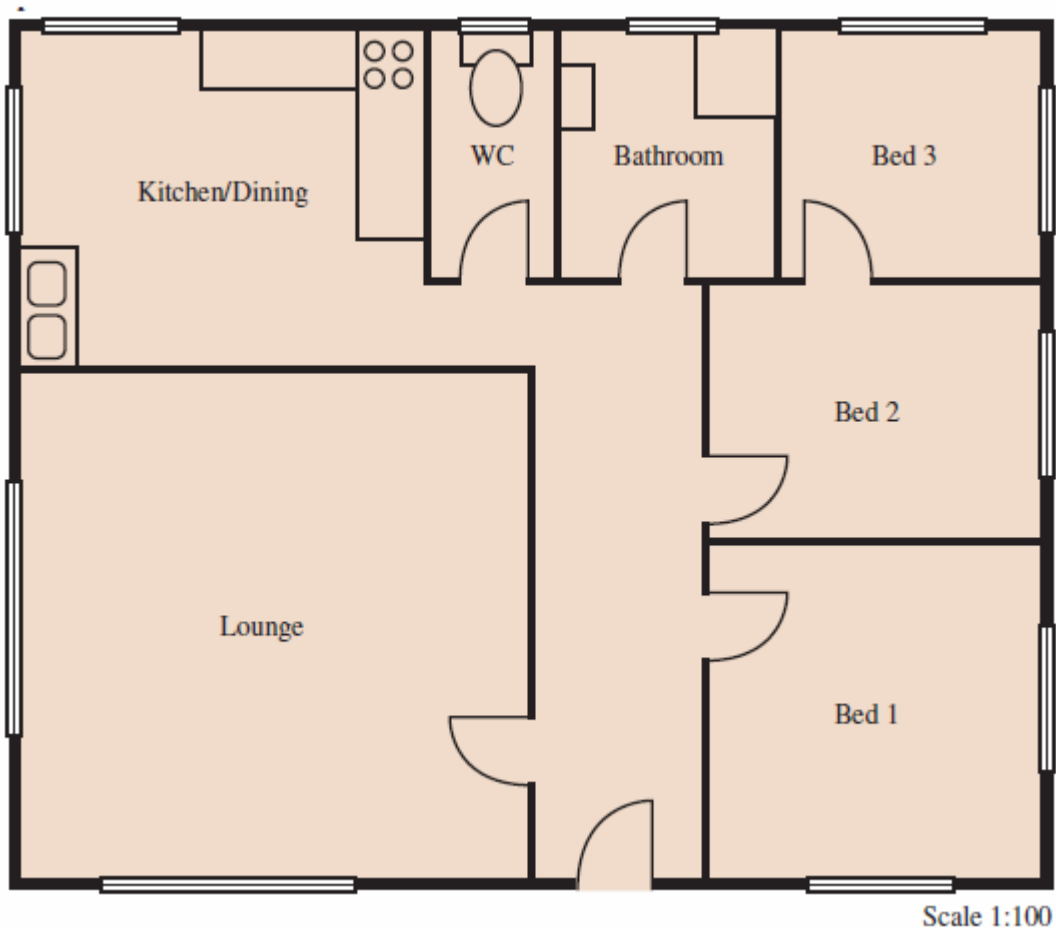
NAME THAT SYMBOL!!!!

BATHROOM	APPLIANCES
	
	
	
	
STRUCTURAL	
	
	
	
OTHERS	

READING HOUSE PLANS

House plans are a perfect example of similarity in the real world. They are a “bird’s eye view” of the house.

Here is an example of a house plan.



(Scale could be out)

- Calculate the dimensions of the house
- Calculate the area of the lounge room.
- Calculate the width of the window in Bedroom 2.

House plans can also be drawn to present the side views. These are called **elevations**. They are also drawn to scale. Below is an example of the front elevation of a house.

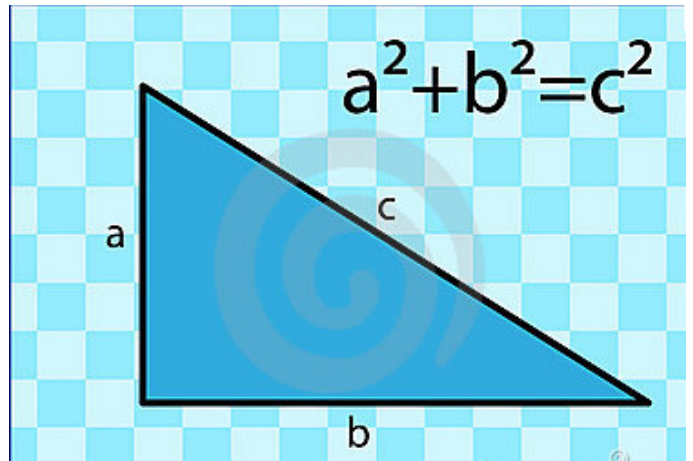
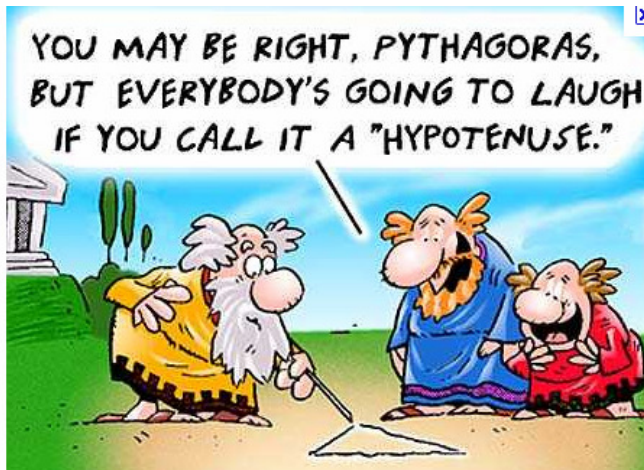


- a) Calculate the height of the eaves on the lower side of the house.
- b) Measure the angle of the pitch of the roof.

**What are
eaves?**

Create your own amazing house plan using the iBlueprint app.
Upload it by emailing to yourself and make it an image. Drop it into
upad.

PYTHAGORAS' THEOREM



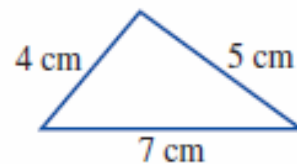
ADD...
if you are
calculating the
hypotenuse
 $a^2 = b^2 + c^2$

Pythagoras' theorem

$$a^2 = b^2 + c^2$$

SUBTRACT...
if you are
calculating a
shorter side
 $b^2 = a^2 - c^2$

eg Justify if the triangle is right angled.



eg The fire brigade attends a blaze in a tall building. They need to rescue a person from the 6th floor of the building, which is 30 metres above ground level. Their ladder is 32 metres long and must be at least 10 metres from the foot of the building. Can the ladder be used to reach the people needing rescue?

TRIGONOMETRY

	<p>Sine: $\sin \theta = \frac{opp}{hyp}$</p> <p>Cosine: $\cos \theta = \frac{adj}{hyp}$</p> <p>Tangent: $\tan \theta = \frac{opp}{adj}$</p>
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eg Find the value of the following, correct to 3 decimal places.

- (a) $\tan 60^\circ$
- (b) $30 \sin 75^\circ$
- (c) $\frac{8}{\cos 74^\circ}$
- (d) $\tan 53^\circ 34'$

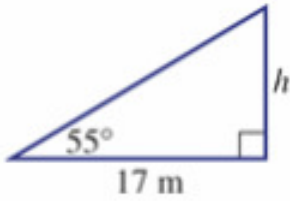
eg Find the value of the following, correct to the nearest minute.

- (a) $\sin \theta = 0.745$
- (b) $\tan \alpha = 1$
- (c) $2 \sin \beta = 1$

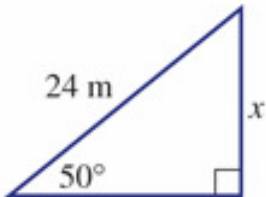
eg If $\sin \theta = \frac{3}{8}$, find the exact ratios of $\cos \theta$, $\tan \theta$ and $\cot \theta$

FINDING THE UNKNOWN SIDE

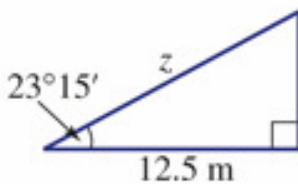
eg Find the length of h , correct to the nearest centimetre.



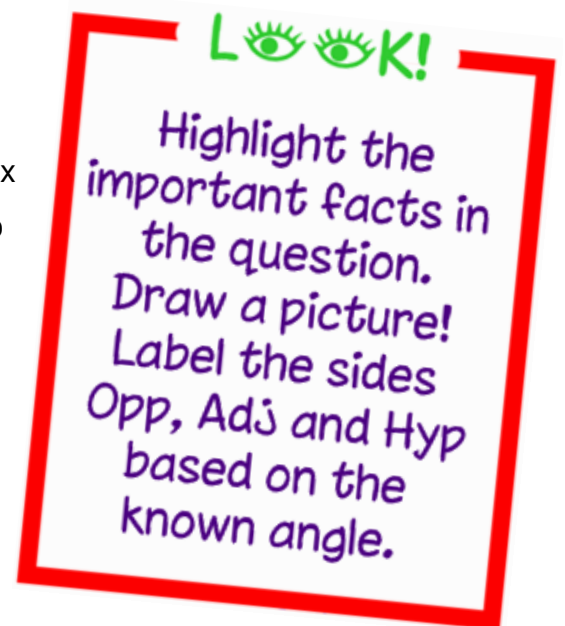
eg Find the length of x , correct to two significant figures.



eg Find the length of z , correct to one decimal place.



eg A flying fox is used in an army training camp. The flying fox is supported by a cable that runs from the top of a cliff face to a point 100m from the base of the cliff. The cable makes a 15° angle with the horizontal. Find the length of the cable used to support the flying fox.



FINDING AN UNKNOWN ANGLE



Make sure your

calculator

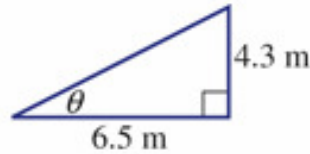
has DEG on it

not RAD or GRA or

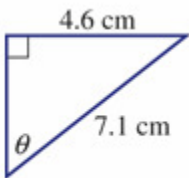
things will get

VERY MESSY!!!!

eg Find the size of angle θ , correct to the nearest degree.



eg Find the size of angle θ , correct to the nearest minute.

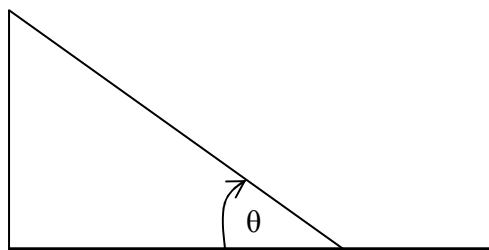


eg A ladder is leant against a wall. The foot of the ladder is 4m from the base of the wall and the ladder reaches 10m up the wall. Calculate the angle that the ladder makes with the ground.

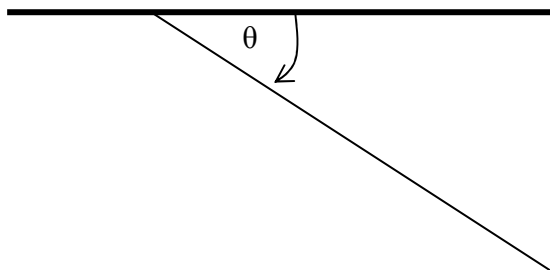
ANGLES OF ELEVATION & DEPRESSION

- 💡 The **angle of elevation** is the angle measured from the horizontal in an **upwards** direction.
- 💡 The **angle of depression** is the angle measured from the horizontal in a **downwards** direction.

Angle of elevation:



Angle of depression:



eg The angle of depression from the top of a 50m building to a boy below is $60^\circ 30'$. How far is the boy from the building to 1 decimal place.

Draw a picture!!!!

eg From an aeroplane flying at an altitude of 3 500 m, the runway is sighted at an angle of depression of 12° . Calculate the distance of the aeroplane from the runway, correct to the nearest kilometre.